

Appl. No: 10/821,658
RCE and Amdt. dated: May 10, 2006
Final Office Action of: January 10, 2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. – 3. (Cancelled)
4. – 5. (Withdrawn)
6. – 7. (Cancelled)
8. (Withdrawn)
9. (Cancelled)
10. – 12. (Withdrawn)
13. – 14. (Cancelled)
15. (Withdrawn)
16. – 18. (Cancelled)
19. (Withdrawn)
20. – 23. (Cancelled)
24. (Withdrawn)
25. – 26. (Cancelled)
27. (Withdrawn)
28. – 29. (Cancelled)
30. – 60. (Withdrawn)
61. – 69. (Cancelled)
70. (New) A method of interrogating a container, comprising the steps of:
 - a) irradiating the container for approximately 30 seconds with neutrons having energies between about 2.45 and 14 MeV or with a gamma ray beam having an energy of at least 10 MeV;
 - b) stopping the irradiating;
 - c) after stopping the irradiating, counting β-delayed gamma rays having an energy range between about 3 and 6 MeV for approximately 30 seconds;

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- d) making a first plot comprising number of β -delayed gamma rays counted in step c as a function of β -delayed gamma ray energy to produce an observed energy spectrum;
- e) making a second plot of the total number of β -delayed gamma rays counted in a portion of the energy range as a function of time in order to determine an effective half-life;
- f) comparing the observed energy spectrum with known energy spectra produced by fission products of special nuclear materials; and
- g) concluding that there are special nuclear materials in the container when:
 - the observed energy spectrum and the known energy spectra have the same overall shape; and
 - the observed effective half-life is approximately 20 to 30 seconds or less.

- 71. (New) The method of Claim 70 wherein the neutrons comprise D-D neutrons.
- 72. (New) The method of Claim 70 wherein the neutrons comprise D-T neutrons.
- 73. (New) The method of Claim 70 wherein the gamma ray beam has an energy between approximately 10 and 30 MeV.
- 74. (New) The method of Claim 70 wherein a plastic or liquid scintillation detector is used for the counting step.
- 75. (New) The method of Claim 70 wherein the portion of the energy range is between approximately 3 and 4 MeV.
- 76. (New) The method of Claim 70 wherein the portion of the energy range is between approximately 4 and 6 MeV.
- 77. (New) The method of Claim 70 wherein, in step g, the observed energy spectrum and the known energy spectra having the same overall shape comprises having the same overall shape wherein the number of β -delayed gamma rays decreases as the energy increases at energies greater than approximately 3 MeV.
- 78. (New) The method of Claim 70 wherein:
 - the container has dimensions of approximately 8 feet by 40 feet by 8.5 feet and is made of steel;
 - the container holds at least 500 grams of Pu-239;

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the neutrons have an energy of 14 MeV;

the neutrons have a flux of approximately 3.8×10^4 neutrons/cm² sec at a distance of approximately 15 feet from the container;

detectors surrounding the container on at least three sides and having at least 10% efficiency are used for the counting; and

at least 1000 β-delayed gamma rays with energies above 3 MeV are counted.

79. (New) The method of Claim 70 wherein:

the container has dimensions of approximately 8 feet by 40 feet by 8.5 feet and is made of steel;

the container holds at least 500 grams of U-235;

the neutrons have an energy of approximately 14 MeV;

the neutrons have a flux of approximately 3.8×10^4 neutrons/cm² sec at a distance of approximately 15 feet from the container;

detectors surrounding the container on at least three sides and having at least 10% efficiency are used for the counting; and

at least 350 β-delayed gamma rays with energies above 3 MeV are counted.